CASE REPORT

Endodontic treatment of teeth associated with a large periapical lesion

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Abstract

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Aim To report the healing of a large periapical lesion following non-surgical root canal treatment.

Summary A 12-year-old male with a large periapical lesion around the apices of his mandibular incisors is described. The lesion formed after trauma to the mandibular anterior teeth 5 years previously. During root canal treatment, chlorhexidine gluconate was used for irrigation, and calcium hydroxide was used both for the intracanal dressing and as a base of the root canal sealer. Periapical healing was observed 3 months after obturation and continued at the 12-month review.

Key learning points

- Root canal treatment, including the use of chlorhexidine gluconate and calcium hydroxide for infection control, led to substantial healing of a large periapical lesion.
- This report confirms that large periapical lesions can respond favourably to non-surgical treatment.

Keywords: calcium hydroxide, chlorhexidine gluconate, endodontic therapy, periapical healing, periapical lesion.

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Introduction

Traumatic injuries of teeth are a frequent occurrence and usually involve the anterior teeth of young patients. Pulpal necrosis is a frequent sequel of trauma and if microbial infection occurs, this will result in the development of a periapical lesion (Sundqvist 1976). Conventional root canal treatment is aimed primarily at eliminating these bacteria as completely as possible (Weiger *et al.* 2000). Treatment options to manage large periapical lesions range from non-surgical root canal treatment and/or apical surgery to extraction. Current philosophy in the treatment of teeth with large periapical lesions includes the initial use of

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non-surgical root canal treatment. When this treatment is not successful in resolving the periradicular pathosis, additional treatment options should be considered. Such treatment may include non-surgical retreatment to rule out morphological abnormalities or treatment inadequacies. Surgery may occasionally be required. Surgical treatment of persistent extensive periradicular lesions most often involves curettage and apical resection. However, simpler approaches such as marsupialization or tube decompression may be alternatives for large cystic lesions (Hoen *et al*. 1990).

Radiographic differentiation of periapical cysts and granulomas is notoriously difficult. Natkin *et al*. (1984) analysed the data of various studies relating radiographic lesion size to histology. They stated that with a radiographic lesion size of 200 mm^2 or larger, the incidence of cysts was almost 100%. If the lesion is separate from the apex and with an intact epithelial lining (apical true cyst, Nair 1998), it may have developed into a self-perpetuating entity that may not heal when treated non-surgically. On other occasions, a large periapical lesion may have a direct communication with the root canal system (apical pocket cyst, Nair 1998) and respond favourably to non-surgical treatment (Hoen *et al*. 1990). Some clinical studies have confirmed that simple non-surgical treatment with proper infection control can promote healing of large lesions (Çalışkan & Şen 1996, Weiger *et al*. 2000). An awareness of root canal morphology and careful interpretation of preoperative radiographs is necessary for adequate access and infection control in endodontic therapy. This is likely to have a critical bearing on outcome. Mandibular incisors are often anatomically complex, with 45% displaying second canals (Kartal *et al*. 1992). Such teeth may fail to respond to treatment if important anatomy is missed. They may also fail to respond well to surgery if infection has not been controlled.

The following case report describes the endodontic treatment of traumatized mandibular incisors which were associated with a large periapical lesion.

Report

A 12-year-old male patient was referred to the Department of Endodontics in the Dental Faculty of Ankara University for treatment of mandibular left and right central and lateral incisor teeth. The patient stated that he was involved in a bicycle accident when he was 7 years old and had not seen a dentist, since he had no complaint. The patient's history did not reveal whether the teeth were luxated, intruded or extruded. Until the age of 12, he sometimes had mild pain but no swelling in the mandibular anterior region. Clinical examination of soft tissues showed no signs of scarring or fistulae. None of these teeth were discoloured. Both the central and lateral incisors were slightly sensitive to percussion and palpation, but there was no mobility. Mandibular right and left lateral and right central incisor teeth failed to respond to electric pulp testing, whereas the mandibular left lateral incisor responded within normal limits.

Periapical radiographs demonstrated a large radiolucent lesion around the apices of the mandibular incisors with a well-defined margin around the apex of the mandibular left lateral incisor (Fig. 1). This tooth gave a normal response to electric pulp tests.

Despite this positive sensitivity test, root canal treatment was initiated on all mandibular incisors. The mandibular left lateral incisor was anaesthetized and rubber dam applied. Following access cavity preparation, vital pulp tissue was extirpated and the working length was estimated as being 1 mm short of the radiographic apex. The canal was prepared with size 15–40 K-files using a step-back technique. The other three incisors that had necrotic pulp tissue were accessed and size 15 K-files were passed beyond the apical foramen. Copious, mucopurulent fluid was drained through the root canals. When drainage ceased, the canals were prepared 1 mm short of the radiographic apices with size 15–40 K-files using a step-back technique. Canals were irrigated copiously with 0.2% chlorhexidine gluconate. Calcium hydroxide powder (Merck, Darmstadt, Germany) was mixed with sterile

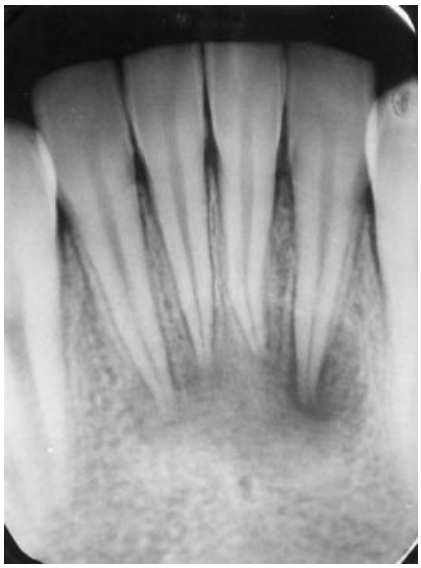

Figure 1 Preoperative radiograph showing mandibular central and lateral incisors with large periapical lesion.

Figure 2 Radiograph taken immediately after endodontic treatment.

Figure 3 Follow-up 3 months after completion of endodontic treatment. Periapical radiograph shows healing of the periapical lesion.

distilled water to form a paste and placed into the canals with a lentulo filler. Access cavities were sealed with the temporary filling material Cavit G (ESPE Dental AG, Seefeld, Germany). The intracanal dressing was changed weekly for 6 weeks, at which time the teeth were asymptomatic and the canals could be dried. At this visit, following irrigation with 0.2% chlorhexidine gluconate, the root canals were obturated with gutta-percha (Hygenic, Akron, OH, USA) and Apexit (Vivadent, Liechtenstein) by lateral condensation (Fig. 2). Access cavities were sealed with composite resin (Charisma, Kulzer, Germany). The patient was recalled after 3 months when radiographic examination revealed significant healing (Fig. 3).

Figure 4 Radiograph taken at follow-up examination 6 months after completion of endodontic treatment. Healing of periapical lesion is evident.

Figure 5 Recall radiograph taken 1 year after completion of treatment.

Radiographs showed that the radiolucent area was absent and that trabecular bone was forming. Clinical examination showed no sensitivity to percussion or palpation and the soft tissues were healthy. The next two radiographs at 6 months (Fig. 4) and 1 year (Fig. 5), revealed further bony healing.

Discussion

The response to trauma can be varied. Some pulps remain apparently normal with no adverse effects, whereas others become necrotic. Necrotic pulps provide a good nutritional supply for pathogenic bacteria, which must be present for the development of a periapical lesion. In some cases periapical inflammation begins before the pulp is totally necrotic, and it is possible to have periapical radiolucency despite the presence of some vital tissue remaining in the root canal (Sundqvist 1976, Khayat *et al.* 1988). In the present case there was vital pulp tissue in the mandibular left lateral incisor despite the fact that there was a radiolucent lesion beyond the apex. Since this tooth was slightly sensitive to percussion and palpation, root canal treatment was initiated. The preoperative radiographic appearance of the mandibular left lateral incisor suggested the possibility of a second root. However, a further view at a different angle confirmed that the tooth had only one root.

Root canal treatment is based primarily on the removal of microbial infection from the complex root canal system. Irrigants aid in reducing the microbial flora of infected canals and if a tissue-solvent solution is used, can help to dissolve the necrotic tissue. Irrigating the canal system with chlorhexidine gluconate is an alternative to other irrigants (Jeansonne & White 1994, Yeşilsoy *et al.* 1995). Delany *et al.* (1982) tested chlorhexidine gluconate (0.2%) in a laboratory study using extracted teeth, and reported that it could be effective as an antibacterial agent when used as an endodontic irrigant. Kuruvilla & Kamath (1998) compared the antimicrobial efficacy of 2.5% sodium hypochlorite and 0.2% chlorhexidine gluconate. They reported that chlorhexidine gluconate was as effective, or possibly more effective in

its antimicrobial activity than sodium hypochlorite. It has also been shown that chlorhexidine-treated root canals may be less susceptible to reinfection, which might be a clear advantage in the control of coronal leakage (Heling *et al*. 1992). However, chlorhexidine has none of the tissue-dissolving activity of sodium hypochlorite.

A calcium hydroxide-based paste was used as an antibacterial dressing and a calcium hydroxide containing sealer was used for permanent root canal obturation. Sjögren *et al*. (1991) found that the use of calcium hydroxide as a dressing for 1 week efficiently eliminates bacteria in the root canals. It has also been reported that treatment with calcium hydroxide resulted in a high frequency of periapical healing and some lesions, especially in young patients, were reduced or had completely disappeared only 1 or 3 months after treatment (Çalışkan & Şen 1996, Çalışkan & Türkün 1997). Similarly, in the present case periapical healing appeared to be occurring 3 months after root canal obturation, and continued during the 12-month observation period. Radiographic signs such as density change within the lesion, trabecular reformation and *lamina dura* formation, especially around the apex of tooth 32, confirmed healing, particular when associated with the clinical finding that the teeth were asymptomatic and the soft tissues were healthy. It is difficult to determine with routine radiographic examination whether there is complete healing or whether decompression of the lesion reduced erosion of the cortical plates. More sophisticated techniques such as tomography and magnetic resonance may provide better intrabony imaging.

Conclusion

In this case report, root canal treatment proved successful in promoting healing of a large periapical lesion. This confirms that even large periapical lesions can respond favourably to non-surgical treatment.

References

Çalışkan MK, Şen BH (1996) Endodontic treatment of teeth with apical periodontitis using calcium hydroxide: a long-term study. *Endodontics and Dental Traumatology* **12**, 215–21.

Çalışkan MK, Türkün M (1997) Periapical repair and apical closure of a pulpless tooth using calcium hydroxide. *Oral Surgery, Oral Medicine and Oral Pathology* **84**, 683–6.

Delany GM, Patterson SS, Miller CH, Newton CW (1982) The effect of chlorhexidine gluconate irrigation on the root canal flora of freshly extracted necrotic teeth. *Oral Surgery, Oral Medicine and Oral Pathology* **53**, 518–23.

Heling I, Sommer M, Steinberg D, Friedman M, Sela MN (1992) Microbiologic evaluation of the efficacy of chlorhexidine in a sustained-release device for dentin sterilization. *International Endodontic Journal* **25**, 15–9.

Hoen MM, Labounty GL, Strittmatter EJ (1990) Conservative treatment of persistent periradicular lesions using aspiration and irrigation. *Journal of Endodontics* **16**, 182–6.

Jeansonne MJ, White RR (1994) A comparison of 2.0% chlorhexidine gluconate and 5.25% sodium hypochlorite as antimicrobial endodontic irrigants. *Journal of Endodontics* **20**, 276–8.

Kartal N, Yanikoğlu FC (1992) Root canal morphology of mandibular incisors. *Journal of Endodontics* **18**, 562–4.

Khayat BG, Byers MR, Taylor PE, Mecifi K, Kimberly CL (1988) Response of nerve fibres to pulpal inflammation and periapical lesions in rat molars demonstrated by calcitonin gene-related peptide immunocytochemistry. *Journal of Endodontics* **14**, 577–87.

Kuruvilla JR, Kamath MP (1998) Antimicrobial activity of 2.5% sodium hypochlorite and 0.2% chlorhexidine gluconate separately and combined, as endodontic irrigants. *Journal of Endodontics* **24**, 472–6.

Nair PNR (1998) New perspectives on radicular cysts: do they heal? *International Endodontic Journal* **31**, 155–60.

Natkin E, Oswald RJ, Carnes LI (1984) The relationship of lesion size to diagnosis, incidence, and treatment of periapical cysts and granulomas. *Oral Surgery, Oral Medicine and Oral Pathology* **57**, 82–93.

Sjögren U, Figdor S, Spångberg L, Sundqvist G (1991) The antimicrobial effect of calcium hydroxide as a short-term intracanal dressing. *International Endodontic Journal* **24**, 119–25.

Sundqvist G (1976) Bacteriological studies of necrotic dental pulps. (Odontological Dissertations no. 7). Umea, Sweden: Umea University.

Weiger R, Rosendahl R, Löst C (2000) Influence of calcium hydroxide intracanal dressings on the prognosis of teeth with endodontically induced periapical lesion. *International Endodontic Journal* **33**, 219–26.

Yeşilsoy C, Whitaker E, Cleveland D, Phillips E, Trope M (1995) Antimicrobial and toxic effects of established and potential root canal irrigants. *Journal of Endodontics* **21**, 513–5.

